

THYROID HORMONE LEVELS IN HEPATITIS B

Pages with reference to book, From 56 To 57

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ABSTRACT

Thyroid hormone levels were estimated in fifty patients with hepatitis B. In acute phase, T3 was raised in 10% and T4 in 60%. This rise was directly proportional to the transaminases levels. Twenty cases were also studied in the recovery phase where thyroid hormones returned to within normal limits. This rise of T3 and T4 in acute phase is attributed to increased thyroxin binding capacity due to release of thyroid binding globulin into circulation from necrosing hepatocytes (JPMA42: 56, 1992).

INTRODUCTION

The liver plays a central role in metabolism of the thyroid hormones. It produces the main transport protein, thyroxin binding globulin (TBG), which binds 75% of the circulating hormone¹. Deiodination of T4 to T3 occurs mainly in the liver². This process thus initiates both action and catabolism of the hormones. Conjugation, deamination and decarboxylation of side chains of T3 and T4 also occur in the liver^{3,4}. In chronic liver disease, abnormalities of thyroid function are well established. There is reduced conversion of T4 to T3 and low levels of FT3 and FT4^{5,6}. However, there are conflicting reports on thyroid status in acute viral hepatitis⁷⁻⁹. This has been attributed to heterogeneity of population studied in terms of type and severity of hepatitis infection. We have, therefore, studied thyroid hormone levels in hepatitis B in both acute phase and clinical, biochemical recovery phase, to assess the status of thyroid hormone profile in clinically euthyroid individuals.

PATIENTS AND METHODS

Fifty cases of serologically diagnosed hepatitis B (HBs Ag and anti HBc IgM positive) were studied in the acute phase of infection. Thyroid hormones T3, T4 and TSH were estimated by Elisa kits (Boehringer). Liver function tests (bilirubin, alkaline phosphatase, ALT and AST) were done on Hitachi 705 autoanalyser. Of 50 cases initially studied, 30 were lost to follow-up. Thus thyroid hormones assays and LFTs were done in the recovery phase in 20 cases, three weeks later. All the fifty cases were clinically euthyroid. Normal ranges reported for thyroid hormones were predetermined in our laboratory on 100 normal healthy individuals. Statistical analysis included 't' test and correlation coefficient^{10,11}.

RESULTS

In the fifty cases of hepatitis B infection studied in the acute phase, T4 was raised in sixty percent and T3 in ten, while TSH was within normal limits. In twenty cases, where follow-up was possible in the resolved phase, all parameters were within normal limits. Significant reduction in T4 values was observed in the resolved phase as compared to acute phase while T3 reduction was nonsignificant. LFTs were significantly reduced in the resolved phase (Table I).

TABLE I. Hormone levels and LFTs in acute and resolved hepatitis B virus infection.

	T3 ng/ml M±S.D.	T4 ug/dl M±S.D.	TSH ulu/ml M±S.D.	ALP U/L M±S.D.	ALT U/L M±S.D.	AST U/L M±S.D.	T. Bilirubin mg/dl M±S.D.
Acute phase n=50	1.35±0.6	14.7±6.5	1.25±0.73	128±80	634±438	575±328	3.05±1.85
Resolved phase n=20	1.05±0.32	9.85±2.3	1.02±0.87	55±26	48.7±25	37.3±17.3	0.85±0.47
Significance 't' test	NS	P < 0.001	NS	P < 0.001	P < 0.001	P < 0.001	P < 0.001

Patients studied in the acute phase were divided into two groups, (a) with abnormal and (b) with normal thyroid profiles. In group A T3 and T4 or both were raised. Mean T3 was within normal limits while T4 was far beyond normal limits. Transaminases AST and ALT, ALP and bilirubin were markedly raised. In group B thyroid hormones were within normal limits and liver functions were half of those in group A (Table II).

TABLE II. Thyroid hormone levels and LFTs in acute phase hepatitis B in patients with abnormal and normal thyroid profiles.

	T3 ng/ml M±S.D.	T4 ug/dl M±S.D.	TSH ulu/ml M±S.D.	ALP U/L M±S.D.	ALT U/L M±S.D.	AST U/L M±S.D.	T. Bilirubin mg/dl M±S.D.
Group A n=30	2.75±0.8	17.6±3.0	1.77±1.78	243±123	884±901	836±756	6.20±4.9
Group B n=20	0.95±0.4	8.0±1.8	1.25±0.72	165±73	437±548	397±365	2.35±1.56
Normal controls n=10*	0.5-2.0	5-12.5	0-7	39-117	Upto 40	Upto 40	0-1.0

Attempts were made to correlate T3 and T4 levels with those of enzymes AST and ALT. Correlation was nonsignificant for T3 till enzymes levels were beyond 1000 U/L. However for 174, significant correlation was observed from values beyond 500 U/L (Table III).

TABLE III. Correlation of thyroid hormones at various levels of AST and ALT.

	Enzymes levels			
	Upto 250 U/L	Upto 500 U/L	Upto 1000 U/L	More than 1000 U/L
T3 ng/ml M±S.D.	1.15±0.6	1.05±0.56	1.25±0.66	1.65±0.83
T4 ug/dl M±S.D.	13.5±4.0	14.32±3.5	15.5±2.0	18.6±3.0
Correlation	T3 NS	T3 NS	T3 NS	T3 Significant
Significance	T4 NS	T4 NS	T4 Significant	T4 Significant
P < 0.05				

DISCUSSION

This study shows that in clinically euthyroids with acute hepatitis B virus infection, there is rise of serum T3 in 10% and T4 in 60% of the patients respectively. This rise is proportional to the extent of hepatocyte necrosis as shown by jaundice and high transaminases in those patients where T3/T4 were

raised when compared to those with normal thyroid functions. Furthermore, correlation of rise of T3/T4 and increased values of transaminases is significant in extensive hepatic cell death, i.e., enzymes beyond 1000 U/L levels. Earlier reports agree with our findings when one considers the rise of T4⁹. However, no report shows rise of T3 values⁷⁻⁹. This rise of Li has been attributed firstly due to release of thyroid binding globulin into circulation as a result of hepatic cell death and secondly to reduced conversion of T4 to T3⁹. This may be a valid explanation in severe cases of hepatitis and not in mild to moderate cases where no alteration of thyroid hormones was observed. We report rise of T3 while others have not seen any rise of T3 and in fact reported reduction of FT3⁹. Considering the conjugation of T3 and T4, we know that Li preferentially forms glucuronides while T3 conjugates to sulphate. Both are excreted in bile while the former can also be found in the systemic blood⁴. It is possible that the released TBG binds this conjugate Li, raising serum T3. Since the patients are clinically euthyroid, the rise of T3/T4 is due to the increased binding capacity of serum specially when TSH levels are unaltered. This is further supported by the fall of T3/T4 in the recovery phase. Thyroid hormone profile can thus be a good index of severity of cell death and of value in predicting the future course of the disease process. This is specially so when we know that progression of liver disease to the chronic phase causes disturbances of the thyroid hormone metabolism^{5,6}.

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